

## PATENT SPECIFICATION

780,652



Date of filing Complete Specification : June 23, 1955.

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## COMPLETE SPECIFICATION.

ERRATUMSPECIFICATION NO. 780,652

The heading above the title on Page 2, should read "PROVISIONAL SPECIFICATION".

THE PATENT OFFICE,  
18th December, 1957

DB 01301/2 (4) /3618 150 12/57 R

concerned with internal splints used in connection with injuries to the spinal column.

According to the present invention there is provided apparatus for spinal fixation, comprising first and second elongated strips, each having at least one slot extending in the longitudinal direction thereof, clamping means that can be entered in said slots for cramping the first and second strips towards each other and means for preventing any relative movement between the clamping means and the strips when the first and second strips have been cramped towards one another.

For a better understanding of the invention and to show how the same may be carried into effect reference will now be made to the accompanying drawing which shows an exploded view of an apparatus for spinal fixation.

Referring to the drawing, 1 and 2 are metal strips. The strips can, as is shown in the drawing, have rounded ends. The strips have longitudinally extending slots 3 and 4 formed therein. Serrations 5 are provided on one face of each of the strips 1 and 2. The serrations 5 are transverse to the longitudinal extent of the strips. Several bolts 6, one for each vertebra that it is desired to use as an anchor for the strips, are passed through the slots 3 and 4 and through the spinous processes of the associated vertebrae

a location where the spine is dislocated, or has suffered some similar damage, the strips 1 and 2 are placed adjacent to, and at each side of, the upstanding spinous processes of the vertebrae 7, with the serrations 5 facing away from the spinous processes of the vertebrae. The strips 1 and 2 are positioned relative to the damaged part of the spine so that the strips extend over at least two further spinous processes on either side of the damaged part. Each of the spinous processes embraced by the strips has a hole formed therein, the diameter of each hole being such as to allow a bolt 6 to pass therethrough. The holes are, in practice, formed with a right angled trocar pointed awl. Each bolt 6, its associated washer 9, is then passed through the strip 2, the spinous process of the vertebra 7 and the strip 1. The nuts 10 are then screwed on the bolts 6 by rotating the bolt. The serrations 11 and 12 are engaged with the serrations 5, and the bolts are tightened using a ratchet spanner or the like which fits onto the bolt head. It will be seen that by tightening the nuts 10 on the bolts 6 the spinous processes are firmly gripped between the strips 1 and 2.

It will be apparent that the provision of the elongated slots 3 or 4, enables the positions of the bolts, relative to the strips, to be varied in accordance with the particular conditions present, e.g., spacing be-

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## COMPLETE SPECIFICATION.

### Improvements in or relating to Apparatus for Use in Spinal Fixation.

We, ZIMMER ORTHOPAEDIC LIMITED, a British Company, and THOMAS PALMER EVANS, of British nationality, both of George Street, Bridgend Trading Estate, Glamorgan, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

10 This invention relates to apparatus for use in spinal fixation and is more particularly concerned with internal splints used in connection with injuries to the spinal column.

According to the present invention there 15 is provided apparatus for spinal fixation, comprising first and second elongated strips, each having at least one slot extending in the longitudinal direction thereof, clamping means that can be entered in said slots for 20 cramping the first and second strips towards each other and means for preventing any relative movement between the clamping means and the strips when the first and second strips have been cramped towards 25 one another.

For a better understanding of the invention and to show how the same may be carried into effect reference will now be made to the accompanying drawing which shows an 30 exploded view of an apparatus for spinal fixation.

Referring to the drawing, 1 and 2 are metal strips. The strips can, as is shown in the drawing, have rounded ends. The strips 35 have longitudinally extending slots 3 and 4 formed therein. Serrations 5 are provided on one face of each of the strips 1 and 2. The serrations 5 are transverse to the longitudinal extent of the strips. Several bolts 6, 40 one for each vertebra that it is desired to use as an anchor for the strips, are passed through the slots 3 and 4 and through the spinous processes of the associated vertebrae

7. A washer 9 is provided for inter-posing between the head of each of the bolts 6 and that side of the strip 2 that is adjacent thereto. Nuts 10 are used with the bolts 6, such nuts, as also the washers 9, being of rectangular form and having serrations 12 and 11 respectively formed on one face thereof. The serrations 11 and 12 are shaped so that they can co-operate with the serrations 5.

The strips 1 and 2 are used as follows. At a location where the spine is dislocated, or has suffered some similar damage, the strips 1 and 2 are placed adjacent to, and at each side of, the upstanding spinous processes of the vertebrae 7, with the serrations 5 facing away from the spinous processes of the vertebrae. The strips 1 and 2 are positioned relative to the damaged part of the spine so that the strips extend over at least two further spinous processes on either side of the damaged part. Each of the spinous processes embraced by the strips has a hole formed therein, the diameter of each hole being such as to allow a bolt 6 to pass therethrough. The holes are, in practice, formed with a right angled trocar pointed awl. Each bolt 6, its associated washer 9, is then passed through the strip 2, the spinous process of the vertebra 7 and the strip 1. The nuts 10 are then screwed on the bolts 6 by rotating the bolt. The serrations 11 and 12 are engaged with the serrations 5, and the bolts are tightened using a ratchet spanner or the like which fits onto the bolt head. It will be seen that by tightening the nuts 10 on the bolts 6 the spinous processes are firmly gripped between the strips 1 and 2.

It will be apparent that the provision of the elongated slots 3 or 4, enables the positions of the bolts, relative to the strips, to be varied in accordance with the particular conditions present, e.g., spacing be-

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5      between the spinous processes. The main restriction is that the serrations 11 and 12 must co-operate with the serrations 5. The serrations on the strips, nuts and washers prevent movement of the bolts with respect to the strips.

5      Although the illustrated strips are straight the strips may be curved for lumbo-sacral fusion purposes.

10     Instead of providing serrations on one face of each of the strips, the strips could be knurled on one face thereof, in which case the washers and the nuts would be likewise knurled.

15     The strips 1 and 2, the bolts 6, washers 9, and nuts 10 are made from stainless steel or any other material which is not injurious to the human body.

What we claim is:—

20     1. Apparatus for spinal fixation, comprising first and second elongated strips, each having at least one slot extending in the longitudinal direction thereof, clamping means that can be entered in said slots, for cramping the first and second strips towards each other, and means for preventing any relative movement between the clamping

25     25

means and the strips when the first and second strips have been cramped towards each other.

30     2. Apparatus as claimed in Claim 1, wherein one face of each strip is formed with a plurality of irregularities, the latter being produced by forming serrations on the face, or by knurling the face.

35     3. Apparatus as claimed in Claim 2, wherein the clamping means each comprise a bolt, nut and washer, the nut having one face similarly formed with irregularities, the arrangement being such that the irregularities on the nut and washer co-operate with the irregularities formed on the strips.

40     4. Apparatus as claimed in any preceding claim wherein the strips are formed from stainless steel.

45     5. Apparatus for spinal fixation, substantially as hereinbefore described with reference to the accompanying drawing.

HASELTINE, LAKE & CO.,  
28 Southampton Buildings,  
Chancery Lane, London, W.C.2,  
Agents for the Applicants.

#### COMPLETE SPECIFICATION.

#### Improvements in or relating to Apparatus for Use in Spinal Fixation.

50     We, ZIMMER ORTHOPAEDIC LIMITED, a British Company, and THOMAS PALMER EVANS, of British nationality, both of George Street, Bridgend Trading Estate, Glamorgan, do hereby declare this invention to be described in the following statement:—

55     The invention consists of two suitable metal plates together with screws, nuts and washers for use as an internal splint in connection with injuries to the Spinal Column.

60     The improvements over the existing equipment are as follows:—

65     (1) These plates which are used in pairs have slots or holes over practically the entire length to permit screws to be inserted through these holes or slots, and also through prepared holes in the spinous processes of the vertebrae, over which the plates are

fastened, whereas on existing plates it is not possible to ensure that the screw holes are correctly placed in relation to the spinal processes, as a result of which, it is often necessary to pass some screws through ligament, thereby causing undue pain to the patient, and reducing the amount of firm anchorage.

70     (2) That the two plates, nuts and washers are knurled or serrated where necessary. This is to prevent any movement of the screws or plates subsequent to the operation, due to shrinkage of the bone or otherwise.

75     T. P. EVANS,  
For and on behalf of  
ZIMMER ORTHOPAEDIC LTD.,  
D. DOUGLAS DAVIDSON, Director.

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780,652 COMPLETE SPECIFICATION

1 SHEET

*This drawing is a reproduction of  
the Original on a reduced scale.*

